FRESHWATER PHOSPHATE LIMITS ARE BASED ON A POORLY STANDARDIZED MOLYBDATE REACTIVE P METHOD

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Phosphate is becoming a main water quality determining factor in regions with intensive animal husbandry. The freshwater limits in Flanders are based on phosphate determined by the molybdate reactive P (MRP) method and the certified laboratories have to adhere to ISO protocols (ISO 15681-2:2003 or ISO 15923-1:2013). Surprisingly, filtration is not specified in these guidelines and sample preparation procedures range from unfiltered to 0.45 µm filtration in these certified laboratories. It is well established that MRP includes both free orthophosphate and phosphate associated with colloidal material such as Fe and Al oxyhydroxides while organic P is only weakly included. The aim of this study was to compare analytical results among certified laboratories and to identify filtration effects on the analytical results. In a round-robin test, ten waters were collected from streams in Flanders and sent to certified laboratories. In addition, the same waters were tested in our laboratory assessing effects of filtration (paper filter, 0.45 µm, 0.1 µm) and dialysis (12-14 kDa) on MRP. The MRP concentrations in the water samples decreased gradually by filtration over progressively smaller membrane pore sizes and after dialysis. Filtration over a 0.45 µm membrane filter reduced MRP concentrations to 74-84% of MRP in unfiltered waters with low Fe (<0.5 mg Fe/L) and to 6-33 % of MRP in unfiltered waters at high Fe (>2.5 mg Fe/L). In the round-robin test, the coefficient of variation of MRP among certified laboratories ranged from 4-71%. We postulate that this variation can be reduced by more stringent laboratory guidelines.